INLAND SEAS ENGINEERING

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10/20/2005

Mr. Richard Rusz
Enforcement Specialist
MDEQ- Water Bureau
Constitution Hall
525 West Allegan
P.O. Box 30273
Lansing, Michigan 30273-7773

OCT 24 2005

Re: Consent Order No. 31-07-02
SECTION IV - ODOR CONTROL WORK PLAN
WILLIAMSBURG RECEIVING & STORAGE
ISE Project # 02061-59E

Dear Mr. Rusz:

Mr. Quandt has relayed to me the substance of recent discussions between Water Bureau (WB) Enforcement Staff and counsel for Cherry Blossom, LLC (CB). I understand from my discussions with him that an Odor Control Work Plan (OCWP) is required for submittal to MDEQ by October 21st. This communication is intended to satisfy the requirement for the OCWP. This submittal includes specific objectives for odor control, the rationale for these objectives along with the work tasks deemed necessary to achieve the objectives and a proposed schedule for implementation.

ORIGINS OF REPORTED ODORS

The reports of odors emanating from the subject site have been observed as characteristic of fruit processing wastes, being described as "septic" and "sulfurous" in nature with varying degrees of odor strength observed over time. Source of odors are thought to originate from three (3) discrete locations at the Cherry Blossom, LLC Processing Plant (Plant). These include:

- Irrigation Pond (Pond)
- Wastewater Equalization/Storage Tanks (Tanks)
- Wastewater Conveyance/Separator Equipment Fugitive Emissions (EFE)

Pond Source

The Pond was initially cited as a source of odor in the summer of 2002. Analyses of pond water in 2002 identified that the biological oxygen demand (BOD) of accumulated pond water was elevated and that the pH and oxidation-reduction (Redox) potential of the water was relatively low. These characteristics typically originate in wastewaters containing biodegradable organics that consume dissolved oxygen in the wastewater and render an anaerobic environment. Anaerobic microorganisms are capable of using electron acceptors other than oxygen to metabolize dissolved organics. Reaction byproducts in an anaerobic environment can include methane, hydrogen sulfide and other organo-sulfuric compounds similar to mercaptans.

Aeration of the pond waters was initiated in August 2002 using Aeration Industries mechanical aerators and a coarse pore bubble diffuser. In September 2002, pond water pH was neutralized using agricultural lime. By June 2003, laboratory testing of pond water indicated that pond water BOD was reduced to less than seven (7) milligrams per liter (mg/L). Aeration was discontinued and odor associated with the pond substantially eliminated. Pond water characterization information is included as Table 1.

Tank Venting Source
Wastewater Equalization/Storage Tanks (Tanks) have been employed at the Plant since August 2002. Odors associated with the operation of the Tanks occur following placement of cherry processing wastewaters within. The anaerobic environmental conditions described above develops within the Tanks upon use and with each 7.5 gallons of wastewater is pumped into a tank, one (1) cubic foot of odor laden air is exhausted from the Tank's vent via displacement. With varying degrees of success, the Tank emissions have been "treated" by utilization of a masking agent. Masking agents typically do not afford any treatment for the substance giving rise to an odor concern. Instead, masking agents typically provide a "counter odor" which is not objectionable and in most cases, is preferable to the offending substance odor.

EFE Sources
Fugitive emissions likely arise from use of the hydroseive which is located in the western end of the maintenance building. Here waste solids that have not been segregated within the Plant are separated just prior to entry of the wastewater into a pump chamber. Solid accumulate in the hydroseive separator bin which is generally uncovered and subaerial. Some solids likely accumulate within the pump chamber, which is also free of a cover and subaerial. Odors have been noted emanating from the room enclosing the hydroseive and pump chamber. Other than routine maintenance and cleaning, no prior odor control measures are known to have been applied against the fugitive emissions from this processing equipment.

ODOR SOURCE CONTROL TECHNICAL ISSUES

EFE Sources
The fugitive emissions from separator and pump equipment do not pose significant technical challenges for control application. Solid waste accumulation within this area is not significant in volume and receptacles containing wastes are easily enclosed. Maintenance schedules can be readily adjusted to promote reductions in source material.

Tank Venting Sources
Masking agents (described below) will continue to be used within the building containing the Tanks. Tank venting and breathing is related directly to plant (pump chamber) operations. Therefore odor control technologies need to be sized to accommodate nominal and peak plant wastewater production. Figure 1 presents pump chamber operational data over a three (3) week period which was recently monitored. As the figure shows, peak vapor displacement rates (equivalent to pumping rates) are estimated at 60 cubic feet per minute (CFM). Average daily venting rates are approximately 2 CFM. The peak and nominal flow rates from Tank vents occur on weekdays, generally arising between the hours of 1:00 AM and 2:00 PM.

Pond Source

Figure 2 is a graph depicting the current Pond volume. The graph shows the relationship between Pond depth (liquid level elevation) and volume, with the match points showing the current elevation and associated volume of approximately 4,000,000 gallons (4MG) of wastewater. The data from Table 1 provide its historic and current wastewater characteristics. The most recent sampling data represented in Table 1 are the mean (arithmetic) concentrations for wastewater characteristics resulting from acquisition of six (6) samples randomly drawn from various locations and depths within the Pond. Table 2 presents the individual sampling data and some statistics regarding its variability. Also included in the table are numeric criteria from Part 22 Rules (see Rule 2222).

No discernable trends are apparent in the vertical distribution of analytes, suggesting the Pond waters are generally homogeneous. Some variability may be expected at the lowest depths (below elevation) where some solids have likely accumulated. As can be seen from this data, dilution is required to reduce Pond water concentrations to Rule 2222 levels. Recent communication from Water Bureau Staff have indicated that BOD levels suitable for discharge likely fall below 200 mg/L or 200 parts per million (ppm). If dilution and discharge are utilized to discharge the contained Pond water (mitigating the source of Pond odors), then BOD criteria govern dilution volumes and yield a required dilution water to Pond water ratio of 50 to 1.

If BOD is treated prior to dilution and discharge, then the governing constituent dictating dilution volumes is the chloride ion, since it is a conservative solute without any treatment technology capable of effectively reducing concentrations. Dilution to meet Rule 2222 levels for discharge based upon chloride concentration yields a dilution ratio of approximately 5 to 1, dilution water to Pond water.

Aggregate oxygen demand from the 4MG of Pond water is calculated simply by converting the volume in gallons to liters (3.87 liters per gallon) and multiplying the volume in liters by the average BOD concentration in milligrams resulting in 330,000 pounds of oxygen needed to reduce the BOD.

Capital Improvements Necessary for Pond Water Pretreatment Dilution and Discharge

Optimal Batch Size for Continuous Operation

To discharge the Pond waters after aeration and dilution a batch mode operation plan was evaluated. A schematic of the operation scenario is supplied as Figure 3. Four (4) 20,000-gallon tanks (frac tanks), connected in series, and would be positioned near the Pond to be used as aeration vessels to decrease the BOD. These would be filled initially, and then aerated to treat BOD. Upon treatment of the first batch, wastewater would then be pumped from the Pond at a slow rate to displace one (1) frac tank volume per day. Four (4) large 2,000 cubic feet per minute (CFM) air compressor blowers would be needed to supply the four (4) frac tanks with adequate oxygen supply. Coarse bubble diffusers positioned in the bottom of the tanks will deliver the air to the wastewater. A large (80,000 cubic feet) biofilter would be needed to control the vapors coming from the aeration operation. One could be constructed near the aeration equipment. The biofilter would contain peat moss, wood chips and assorted biomass medium.

A 130,000-gallon lined dilution/irrigation pond would be constructed near the Pond to mix the aerated wastewater with fresh water at a ratio of about 5:1. The aerated wastewater would flow to the dilution pond from the frac tanks. The fresh water would be supplied by a new, large-capacity water supply well that would be drilled near the dilution pond. Once the aerated wastewater and fresh water are mixed and the discharge standards are confirmed with laboratory testing the pretreated, diluted wastewater could be discharged via a spray irrigation system.

This scenario provides for evacuation of the Pond in approximately 200 days. Evaluation of this concept indicates the following infrastructure elements are required to be purchased or constructed:

4- 21,000-gallon Frac Tanks
4- 2,000 CFM air compressors
1- Large capacity water supply well
1- 130,000-gallon lined dilution pit
1 6-inch irrigation line to the spray irrigation area
1- 80,000 ft^3 Bioreactor for odor control

Due to the nature of treating and discharging water and operating a vapor phase bioreactor this operation will not be able to operate when temperatures are consistently below freezing. Therefore by the time the system is constructed the temperatures will be too cold for operation. Engineering estimates for capital costs to implement the above described Pond Water Treatment and Discharge result in capital costs in excess of $100,000. Operating costs between $600 and $1,200 per day can be expected. A more feasible alternative is presented below as the Odor Control Work Plan.

ODOR CONTROL WORK PLAN

EFE Sources

The solids container associated with the hydroseive will be covered such that only opening in the cover is for the conveyance directing the solids into the container. Similarly, both pump chambers will be covered with removable lids. Only process piping will be routed through the covers. Aerobic conditions within the pump chambers will be promoted by the incorporation of an oxygen diffuser within each of the two (2) chambers. The low flow of oxygen into the pump chamber will generate vapors which require venting. These vapors may include anaerobic byproducts initially until aerobic conditions are sustained. A vent pipe will be installed through the pump chamber covers to direct vapors to a biofilter constructed north of the maintenance building.

Maintenance and cleaning procedures will be enhanced such that separated solids will be removed from the hydroseive room each day. Additionally, the pump chambers and hydroseive screens will be cleaned weekly to eliminate accumulated solids that may give rise to significant oxygen demand and associated anaerobic metabolic byproduct vapors. Interim storage of solids awaiting agronomic land application will only be accumulated inside the maintenance building in polyethylene-lined cherry totes or sealed drums. The interim storage area will be located within the area influenced by masking agent dispensers.

Tank Venting Sources

Vapors venting from Tank will be routed to a biofilter. The biofilter will contain media suitable for adsorption and biodegradation of vapors containing degradable byproducts. The residence time and moisture level in the biofilter will be designed to promote degradation of organic constituent vapors. Vapor sampling will be conducted at the exhaust of the biofilter to analyze for concentrations (if any) of typical anaerobic byproduct vapors. The discharge from the biofilter will be directed to a shallow subsurface diffusion gallery such that further treatment (if needed) on soil is possible.

Pond Source

Due to the significant capital cost and abbreviated discharge period arising from the technical impracticality of initiating water handling practices in early winter months (limited discharge term), the Pond source will be completely covered by a 10-mil, polyvinyl chloride cover. The cover will be placed as soon as available. The margins of the PVC cover will be buried around the circumference of the Pond and freshwater ballast will be placed above the liner to minimize the potential for damage from wind.

The cover will be maintained in-place over the Pond until December 2005. The cover will then be removed and five (5) mechanical aerators will be installed. Three (3) of these aerators will be the same units used previously in the pond to reduce BOD. Two (2) additional units have been acquired to increase oxygen diffusion capacity. Oxygen solubility increases with decreasing liquid temperature, therefore oxygen delivery to the pond is enhanced during a time period when homes are closed for winter heating season and outdoor recreational and occupational activities are diminished. Sampling and analyses of Pond water will be undertaken monthly for BOD and chemical oxygen demand (COD), pH and Redox potential. When analytical data indicates oxygen saturation has occurred, the number of aerators may be reduced to the level necessary to keep Pond water in motion and to support the limited consumption anticipated.

Aerobic respiration decreases with decreasing temperature. To stimulate aerobic activity a ground loop geothermal heating system will be employed. Low density polyethylene tubing similar to that used for irrigation pipe will plowed in below the frost line. A pump will be used to circulate Pond water from the Pond, through the buried tubing and back into the pond. Tubing length pumping rate and zone controls will be developed to maximize geothermal heat transfer to the Pond. To the extent practical, continuous polyethylene tubing will be used. If splices are required, they will be either fusion welded or double clamped.

7 Beginning in March, or as early as possible given the severity of winter, the infrastructure described above for dilution water, batching, mixing and land application will be arrayed adjacent to the Pond. Dilution will initiate as soon as data indicate BOD concentrations are equivalent to or lower than chloride concentrations. Batching will be undertaken by flowing freshwater into the new irrigation basin and adding a proportionate amount of pretreated Pond water. Monitoring of irrigation pond chloride concentrations will be undertaken using a conductivity meter. When the target dilution is attained, a grab sample will be acquired of the irrigation pond water and analyzed for Permit constituents, pH, Redox potential and BOD/COD.

When laboratory results indicate that the diluted wastewater may be applied without exceeding Rule 2222 and Rule 2204 criteria, the wastewater will be land applied using the same style irrigation equipment utilized previously. One-inch nozzle "big gun" impact heads will be used to land apply diluted Pond water to the area shown on Figure 4. An irrigation management plan will be submitted to District Staff for their review and concurrence prior to discharge. Initial plans for discharge rates are proposed to conform to Part 22 Rules.

Contingencies

If during the Pond aeration odors are found to exceed Rule 901 levels, then the number of aerators will be reduced to diminish the detectable odors and additional masking agent dispensers will be employed. If Rule 901 conditions persist, then a foam or floating partial cover will be employed.

PROPOSED SCHEDULE FOR IMPLEMENTATION

Controls for the EFE and Tank Sources will be implemented by October 31, 2005. The Pond PVC cover has been ordered and delivery is anticipated by October 24th. Installation of the Pond cover will be undertaken immediately upon delivery. With aeration beginning in December and discharge potentially possible in March of 2006, it may be possible to properly close the Pond in 2006. Aeration of the Pond is proposed to continue throughout discharge to ensure that sludge or solids remain in an aerobic condition until deminimus levels are achieved. Late stage drainage of Pond waters will be further developed in the Pond Closure Plan required by MDEQ-WB.

Please call me if you have any questions or comments related to this work plan.

Respectfully submitted:
INLAND SEAS ENGINEERING, INC.

Andrew Smits, P.E.
Environmental Engineering
Department Manager

enc. Figures (4) and Tables (3)

cc:	Mr. Alan Hoffman-	Attorney General
	Mr. Richard A. Powers-	MDEQ-WB/Lansing
	Mr. Barry H. Selden-	MDEQ-WB/Lansing
	Ms. Janet Heuer-	MDEQ-WB/Cadillac
	Mr. Michael Stifler, PE	MDEQ-WB/Cadillac
	Mr. Christopher Hubbell-	CBLLC
	Mr. Joseph E. Quandt-	ZKDBTQ
	Ms. Janis Denman-	MDEQ-AQD/Cadillac

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Figure 1
Observed Effluent Flow Rates to Tanks
Williamsburg Receiving and Storage
ISE Project #02061-59E

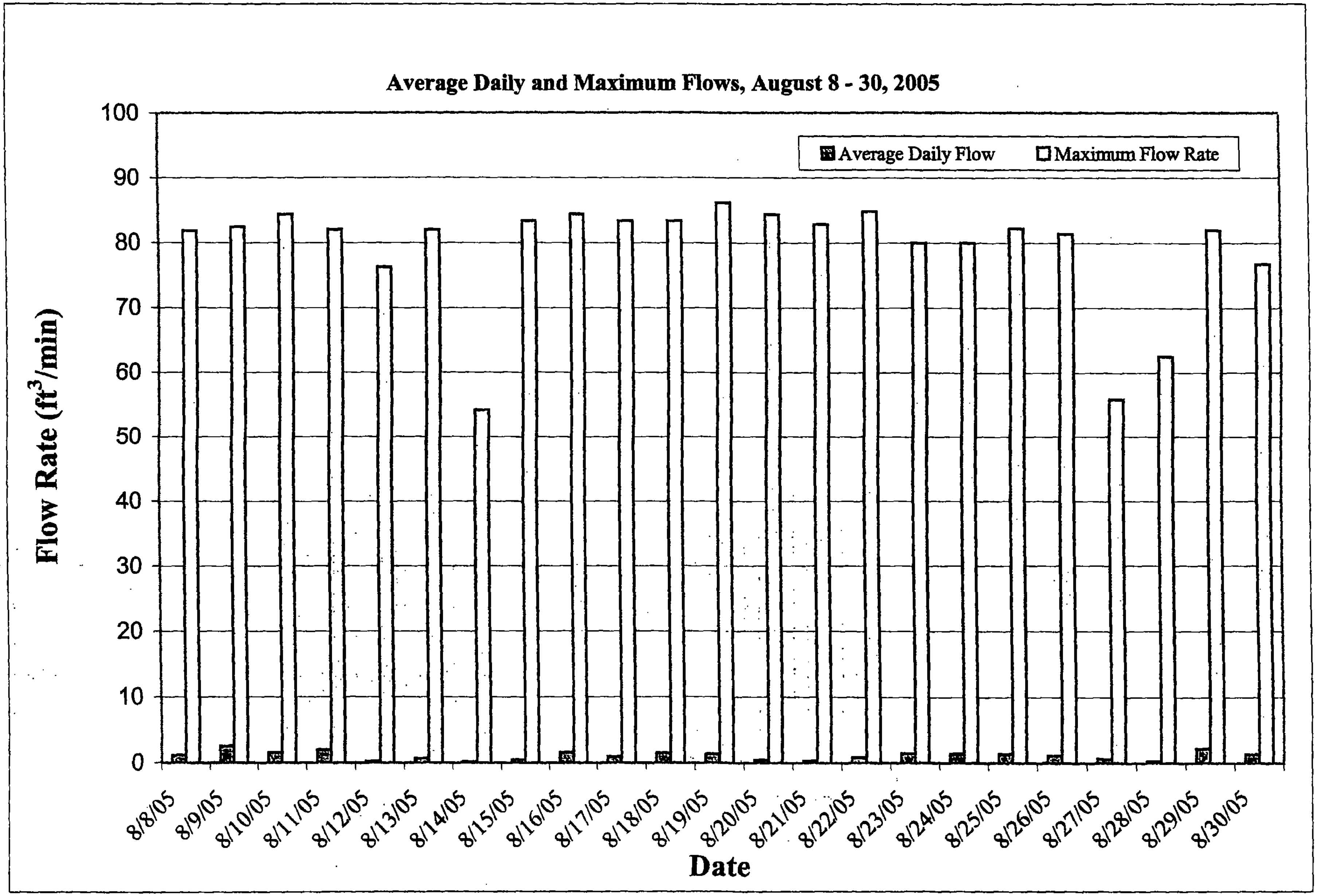


Figure 2
Pond Volume Compared to Water Elevation
Williamsburg Receiving and Storage
ISE Project #02061-59E

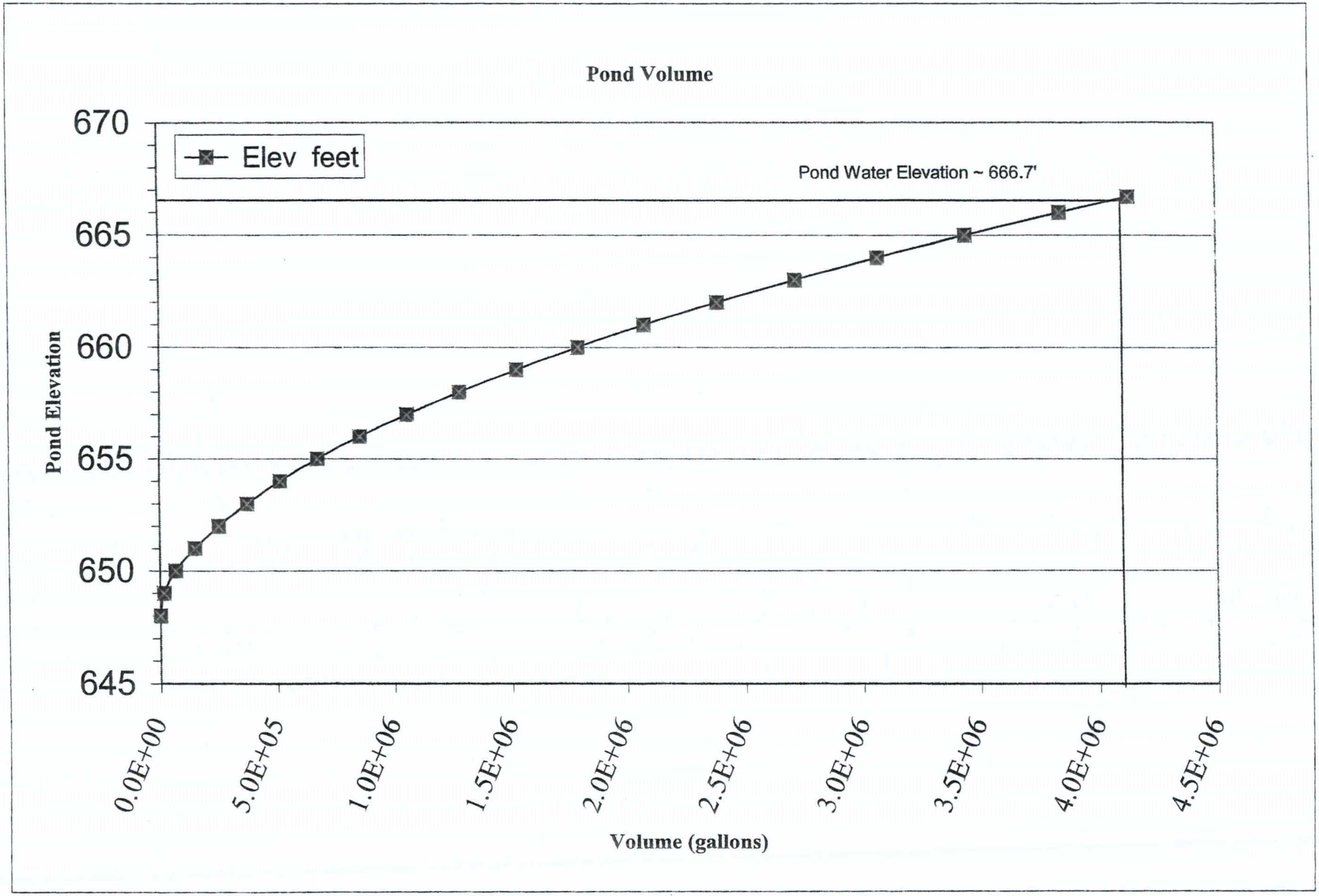
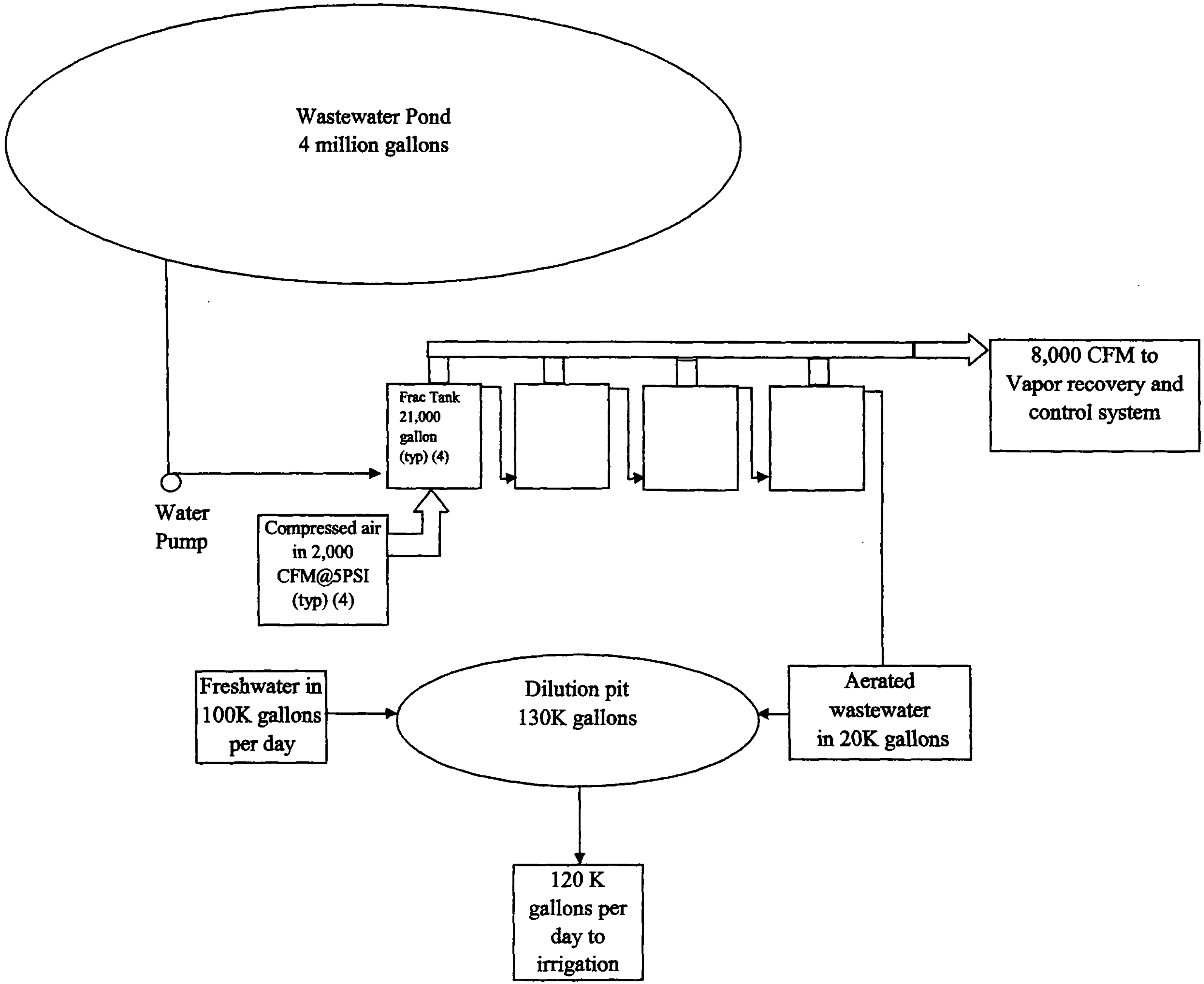


Figure 3
Pond Water Pretreatment, Dilution and Discharge Schematic



INLAND SEAS ENGINEERING, INC.

Exemption 9

[redacted]

Table 1

Date Printed: 10/20/05

Historical Pond Wastewater Analytical Summary

Williamsburg Receiving and Storage

ISE Project #02061-59E

Sampler	Part 22 Discharge Limits	R. Banwell	A. Smits	J. Heurer	J. Heurer	A. Smits	T. Gates	T. Gates	T. Gates
Date Sampled		3/15/02	4/27/02	7/8/02	7/8/02	7/22/02	7/23/02	7/24/02	7/25/02
Sampling Location		Pond Sample	Pond Effluent	Pond Edge	Pump Sample	Pond Surface S.	Pond Sample	Pond Sample	Pond Sample
Nitrogen Species									
TIN	5.0	4.365	6.55	13	16	14.7	NA	NA	NA
Ammonia	none	4.31	6.55	NA	NA	14.7	NA	NA	NA
Nitrate	none	< 0.15	< 2.5	NA	NA	< 0.25	NA	NA	NA
Nitrite	0.5	0.055	< 2.5	NA	NA	< 0.010	NA	NA	NA
Major Ions									
Sodium	150	291	202	270	270	219	NA	NA	NA
Calcium	none	NA	302	NA	NA	212	NA	NA	NA
Sulfate	250	NA	252	890	1200	149	NA	NA	NA
Chloride	250	650	620	630	590	577	NA	NA	NA
Phosphorous									
Ptot	5.0	3.16	3.85	4.80	5.50	2.81	NA	NA	NA
Carbon Species									
Alkalinity	none	NA	28	NA	NA	NA	NA	NA	NA
BOD	none	NA	3330	3100		> 3800	NA	NA	NA
COD	none	NA	5140	NA	NA	4640	**4883**	**4571**	**4780**
Other									
Specific Conductance	none	NA	3360	NA	NA	1810	NA	NA	NA
pH	none	4.6	4.2	NA	NA	NA	4.61	4.71	4.61
Dissolved Oxygen	none	NA	NA	NA	NA	NA	< 1	NA	NA
TSS	none	NA	NA	NA	NA	NA	NA	NA	NA

All laboratory results by SOS Analytical Laboratories, except as noted below

4883	Laboratory report by Trace Analytical Laboratories
890	Laboratory report by SPL Laboratories
BOD	Parameters with this shading are not required by Permit M00836
3128	Value from field measurements
5748	Composite sample prepared by SOS Analytical

Table 1
Historical Pond Wastewater Analytical Summary
Williamsburg Receiving and Storage
ISE Project #02061-59E

Sampler	Part 22 Discharge Limits	G. Hanning	D. Schnerer	Adil T.	J. Hill	J. Hill	J. Hill	A. Smits	L. Mankowski
Date Sampled		8/1/02	8/30/02	9/5/02	3/25/03	3/25/03	6/3/03	6/15/05	9/15/05
Sampling Location		Retention Pond	Pond Sample	Pond Sample	Pond Shallow	Pond Deep	Pond Sample	Pond E$^{1}/_{3}$-South	Six (6) sample Pond Average
Nitrogen Species									
TIN	5.0	16.4	NA	20.3	0.97	16.356	2.446	1.47	18.74
Ammonia	none	16.4	NA	20.3	0.6	5.47	0.4	1.46	18.68
Nitrate	none	<0.25	NA	< 0.25	0.37	9.74	1.9	< 0.25	< 0.25
Nitrite	0.5	<0.010	NA	< 0.010	NA	1.146	0.146	0.01	0.060
Major Ions									
Sodium	150	294	NA	**238**	12.1	293	241	261	418
Calcium	none	288	NA	256	NA	NA	NA	NA	NA
Sulfate	250	76	NA	**51.9**	< 20	70	46	20	< 20
Chloride	250	589	NA	572	7	600	531	673	1039
Phosphorous									
Ptot	5.0	4.89	NA	2.33	< 0.25	0.38	0.54	2.24	3.61
Carbon Species									
Alkalinity	none	NA	NA	298	NA	NA	NA	NA	NA
BOD	none	>3800	NA	632	< 200	< 200	< 7	> 250	*7760*
COD	none	4150	NA	**1026**	100	300	45	1375	9600
Other									
Specific Conductance	none	2150	NA	***3128***	139	3340	2200	3360	5748
pH	none	NA	NA	7.21	NA	NA	NA	6.4	NA
Dissolved Oxygen	none	NA	NA	1.5	NA	NA	NA	NA	NA
TSS	none	NA	NA	NA	NA	NA	NA	NA	*188*

All laboratory results by SOS Analytical Laboratories, except as noted below

4883 Laboratory report by Trace Analytical Laboratories

890 Laboratory report by SPL Laboratories

BOD Parameters with this shading are not required by Permit M00836

3128 Value from field measurements

5748 Composite sample prepared by SOS Analytical

Date Printed: 10/20/05

Table 2
Historical Pond Wastewater Analytical Summary
Williamsburg Receiving and Storage
ISE Project #02061-59E

Sampler	Part 22 Discharge Limits	L. Mankowski	L. Mankowski	L. Mankowski	L. Mankowski	L. Mankowski	L. Mankowski	AVERAGE	Values at One Standard Deviation (68.3%)		Values at 95% Confidence Interval	
Date Sampled		9/15/05	9/15/05	9/15/05	9/15/05	9/15/05	9/15/05					
Sampling Location		Pond (S) Sector 5	Pond (NW) Sector 1	Pond (SE) Sector 6	Pond (NW) Sector 3	Pond (SW) Sector 4	Pond (N) Sector 2					
Sample Depth (feet)		2.0	3.0	7.5	10.0	13.5	14.5					
Nitrogen Species												
TIN	5.0	18.65	16.02	19.38	17.88	18.68	21.85	17.99	19.90	16.08	21.73	14.25
Ammonia	none	18.60	16.0	19.30	17.80	18.60	21.80	17.93	19.83	16.02	21.65	14.20
Nitrate	none	< 0.25	< 0.25	< 0.25	< 0.25	< 0.25	< 0.25	< 0.25	NA	NA	NA	NA
Nitrite	0.5	0.048	0.018	0.084	0.082	0.081	0.046	0.066	0.09	0.04	0.12	0.01
Major Ions												
Sodium	150	397	442	379	422	413	455	414	442	386	469	359
Sulfate	250	< 20	< 20	< 20	< 20	< 20	< 20	< 20	NA	NA	NA	NA
Chloride	250	1016	1014	1021	1011	1005	1165	1013	1075	951	1135	891
Phosphorous												
Ptot	5.0	2.67	3.08	3.41	3.06	2.27	7.14	2.96	4.73	1.18	6.44	-0.53
Carbon Species												
BOD	none	Composite	Composite	Composite	Composite	Composite	Composite	*7760*	NA	NA	NA	NA
COD	none	9000	9100	9000	9000	9500	12000	9150	10342	7958	11486	6814
Other												
Specific Conductance	none	6390	6090	6330	4800	4760	6120	5495	6254	4736	6983	4007
TSS	none	Composite	Composite	Composite	Composite	Composite	Composite	*188*	NA	NA	NA	NA

All laboratory results by SOS Analytical Laboratories

BOD Parameters with this shading are not required by Permit M00836

5748 Composite sample prepared by SOS Analytical